Notes from an India virtual stakeholder consultation on a proposed One CGIAR initiative on Protecting human health through a One Health approach, 24 August 2021

August 2021

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Compiled by Chi Nguyen

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Patron: Professor Peter C Doherty AC, FAA, FRS
Animal scientist, Nobel Prize Laureate for Physiology or Medicine–1996

Box 30709, Nairobi 00100 Kenya
Phone +254 20 422 3000
Fax +254 20 422 3001
Email ilri-kenya@cgiar.org

ilri.org
better lives through livestock

ILRI is a CGIAR research centre

Box 5689, Addis Ababa, Ethiopia
Phone +251 11 617 2000
Fax +251 11 667 6923
Email ilri-ethiopia@cgiar.org

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Background and objectives

To implement its 2030 research and innovation strategy, the CGIAR is developing a series of initiatives designed to achieve a world with sustainable and resilient food, land, and water systems that deliver more diverse, healthy, safe, sufficient, and affordable diets, and ensure improved livelihoods and greater social equality, within planetary and regional environmental boundaries.

CGIAR initiatives are major, prioritized areas of investment that bring capacity from within and beyond CGIAR to bear on well-defined, major challenges.

The aim of the One Health initiative is to protect human health by improving the prevention, detection and control of zoonoses, foodborne diseases and antimicrobial resistance (AMR) in low- and middle-income countries. The One Health initiative plans to work in seven countries: Bangladesh, Côte d'Ivoire, Ethiopia, India, Kenya, Uganda and Vietnam.

To 'ground' and improve the proposed initiative, a series of online meetings were convened with national stakeholders to guide the initiative design team as it formulates the key interventions and work packages to be delivered.

Specifically for India, the team aims to improve the current proposal outline by
- better understanding India's One Health priorities;
- specifying which elements and work packages are highest priority for India;
- identifying missing elements that must be included for it to best serve the situation in India;
- providing feedback to strengthen the proposed approach and framework; and
- identifying key One Health actors in India and their interests in the different work packages.

On 24 August 2021, the International Livestock Research Institute (ILRI) hosted a virtual meeting on Zoom to consult stakeholders in India on this initiative to ensure it can fit well with the needs of the country. The agenda and list of participants can be seen in the annexes to this report which presents a summary of the notes from the meeting and group discussions.

Feedback on the work packages

Zoonoses control

Top zoonosis control challenges

- Poor disease surveillance
- Poor awareness and capacity
- Lack of political commitment and investment
- Poor lab infrastructure
- Poor knowledge, understanding on disease epidemiology
- Poor disease reporting system
- Negligible intersectoral communication
- Poor capacity building programme both for farmers and professionals
- Poor biosecurity
- Inadequate risk/ other communication strategy
- Inefficient collaboration and cooperation among related sectors

Top priority zoonosis interventions

- Anthrax
- Brucellosis
- Tuberculosis
- Cysticercosis
- Japanese Encephalitis
- Rabies
- Leptospirosis
- Q-fever
- Bird flu
- Taeniasis / cysticercosis
- Strengthen surveillance
- Capacity development in epidemiology, lab and communications
- Improve risk communications to the community on zoonosis control
- System approach (surveillance, diagnosis, risk assessment, preparedness and response) contingency planning and simulation exercise to test the functionality of plan

Actions to ensure inclusion

- Women empowerment
- People dealing with wildlife
- Unorganized market actors
- Nomadic (migratory) population
- Marginal farmers and landless labourers
- Backyard poultry and pig production for women and tribal community

Actions to reduce zoonosis risks from wildlife

- Communications and awareness raising in the community. Involve NGOs, entrepreneurs in this area to make community aware

Key partners

International

- WHO
- FAO
- OIE
- UN environment Programme
- ILRI/ CG centers

Country level

- ICAR and ICMR institutes
- State agricultural/veterinary universities
- Medical colleges
- Department of Animal Husbandry and Dairying (DAHD) and other relevant national line departments
- Environment, Forestry and Wildlife Ministry

State and district level

- State level departments of Animal Husbandry, Medical and Fisheries should work in collaboration
- State and district level One Health body
- Avoid working in silos
- Collective actions by line departments,
- Knowledge/ data sharing official mechanism among departments
- Remote sensing organisation

Food safety

Top food safety challenges

- Adulterations and contaminations with heavy metals, environmental pollutants, antimicrobial and pesticide/insecticide residues
- Poor hygienic conditions and lacking cold chains
- No source tracking
- Price sensitivity of consumers and the large informal sector
- Low level of meat inspection, and hygiene in slaughterhouses
- Lack of skills and awareness among all levels of stakeholders
- Knowledge about food pathogens, lack of surveillance, and diagnostic labs
- Healthcare of livestock and awareness of farmers
- Missing real time data on foodborne diseases
- No organised slaughterhouses and meat inspection

Top priority food safety interventions

- Salmonella and campylobacter, parasitic larva
- Pathways for managing non-point source pollution through context specific good practices
- Good Agricultural Practices including good transport, good storage, good housekeeping, good catering, good manufacturing, good hygienic practices, good retail practices
- Stringent laws against adulteration
- Good agricultural husbandry practices
- Improve fish landing centres and markets, cold chains, and hygienic markets
- New approach called “Good Nutritional Practice” (GNP) to balance the food safety systems

- Robust surveillance system (proper implementation needed)
- Preventive measures from production to consumption stage of food chain to reduce infection both at primary producer and industry level
- Need increased capacity for laboratories, include capacity building in proteomics. More resources needed
- Improve post-harvest handling practices
- Need standard operation procedures for food production, to be followed by producers
- Improve personal hygiene of food handlers
- Strengthened food inspection
- Raise awareness on food safety to all actors throughout the value chain
- Cold chain from harvest to sale
- Strict implementation of food safety guidelines
- Improved water quality to reduce contamination
- Dairy officials (or other food safety officers) should have the mandate to conduct surveillance, and need to scale up
- Disease diagnostics facilities needed.
- Participatory situational assessment in traditional food markets
- Use social media platform for awareness raising
- Cooperation between institutions and authorities, creation of milk testing facilities

Action to ensure inclusion

- Need state level platforms to lead the stakeholders
- Capacity building among all stakeholders
- Surveillance system integrating all aspects (including water food)
- Introduce women friendly technologies and encourage entrepreneurship development programmes for vulnerable groups
- Mobilise communities so they bring bottom-up political incentives to demand action and accountability for the services to which they are entitled

Water quality management actions to enhance food safety

- Control use of pesticides and fertilizers
- Slaughterhouse waste can be best treated or recycled by rendering. Biogas very promising, having multiple uses. Poultry waste has been trialed for biodiesel.
- Water conservation is very important
- Soil-water-crop-health continuum is very critical area
- Access to potable water in landing centres and markets
- Manure and wastewater management to reduce groundwater contamination
- Stop polluted water from industries to common water body (river), soil or environment
- Testing laboratories for water
- Establish water treatment and effluent treatment plants in landing centres and markets
- Business models for biogas and Resource Recovery and Reuse (RRR) models for making productive use of animal wastes
- Supply of wholesome water
- Deduction of adulteration of milk and meat

Key partners

- ICAR - NRC on meat

- ICAR- CIFT, Veterinary universities and colleges, Odisha vet college, AAU
- Gender: Central Institute for Women in Agriculture (CIWA)- ICAR institute
- National Rural Health Mission
- FSSAI, State Government, research institutes, fishers, traders, State Food Commissionerate, local market committees

AMR control

Top AMR control challenges

- Awareness of antibiotics stewardship program
- Use of human grade antibiotics for animal production systems
- Free availability of antibiotics, without prescription
- Lack of real time data on antibiotics use, export and import of antibiotics, classification of antibiotics under another category
- Inefficient tracing and tracking of antibiotics use in different production sectors
- Collaboration among related sectors not strong enough
- Decision makers have not seen the consequences of AMR
- No quantification of economic impacts and burden of AMR
- Lack of care diagnostics and lack of vaccines for aquatic animal diseases which lead to overuse of antibiotics
- Polluted water bodies drive use of chemicals and antibiotics in farming systems

Top priority AMR interventions

- Change behaviour of related stakeholders on antimicrobial use (AMU) and AMR
- Need better coordination at national level for data sharing
- Need context specific interventions
- Aquatic food systems - generating data on AMU and AMR
- Raise awareness on best management practices and farm biosecurity
- Need large scale studies to demonstrate field efficacies

Action to ensure inclusion

- Use mass media
- Communicate through civil society
- NGOs, local champions, and interact with local communities
- Health economics, human development cost
- Social scientists for social behaviour change communications

Water quality management actions to control AMR spread

- Waste disposal from agriculture, livestock systems and hospitals
- Wastewater surveillance can be a proxy to understand the AM use situation in a river basin or watershed
- Financing can be critical to providing for safe water supply and sanitation for all. Pollution control mitigation strategies can be a viable option.
- Environmental modelling can be very helpful to understand the pollution dynamics and further to develop mitigation strategies to control pollution of antibiotics and AMR determinants.

Key partners

- ICAR institutes: ICAR – NIVEDI, ICAR – IVRI, ICAR – NRC on Meat, ICAR – NRC on Equine, ICAR – NRC on Pig
- Veterinary colleges
- ICMR, Medical colleges
- State Veterinary/Medical Departments
- FSSAI, NCDC

Chat: The most pressing One Health priorities for India

- ADS for Assam, AMR and food safety for assam and odisha
- Alternative growth promoters for antimicrobial growth promoters
- AMR
- AMR in Assam
- Anthrax in Odisha
- collaboration between human and veterinary medicine sector
- Consumption of half cooked meat of deer and wild boar - Hepatitis E
- Develop a functional mechanism for operationalization of OH!Lots of advocacy but action is lacking!
- Emerging zoonotic pathogens
- Food safety
- Food Safety
- Food Safety
- Food safety AMR and zoonosis for Assam
- food safety and AMR
- food safety and AMR
- Food Safety and AMR
- Food safety and environment
- Food Safety and zoonoses in Odisha
- Mongoose and cat got infection of Mycobacterium tuberculosis feeding at garbage pits of human excretions
- Ownership of exotic and pet animals
- Socioeconomic dimension of anthrax control in Odisha!
- TADS for Assam, AMR and food safety for assam and odisha
- Zoonoses and AMR
- Zoonoses and food safety
- Zoonoses, food safety and AMR
- Zoonotic diseases from wild life is priority

Chat: Advice for the team

- Work together with all stakeholders
- Functional capacity building
- Involve the top policymaker
- communication, cooperation and collaboration
- Make recommendations for stakeholders at different levels (e.g. global governance level like G7 and G20) to help address that gap around advocacy at the highest level for investment at the national level.
- Situation specific Appropriate solutions
- Social Scientist
- Develop working together culture! Making investment case through generating proof of concept!
- Engage with civil society who can use your recommendatiosn in their advocacy
- Needs to influence policy makers to move things happen at the begining
- Policy implementation.
- Get specific feedback on proposal from various stakeholders at all levels
- Prioritise a list of diseases for reducing disease burden
- Awareness creation to the Policymakers too
- Local solution from the ground staff
- Think globally act locally
- Need to work collaboratively by all the concerned sectors/stakeholders involving common people/communities to bring about changes on ground alongwith advocacy with policy makers.
- many disease can be controlled through Awareness programs and implimentation of biosanitary measures
- Should focus on nomadic group

Link to meeting recording

https://ilri-org.zoom.us/rec/share/ALWlpfRvzdZr8rlZFNifyg9eVxgOlz6KwxSKNlArlwiAHiIJmQfuu7ZXzKny4pC2.JexLNRqGPuU6HGM2

Annex 1: Agenda

Time	Session	Responsible
3:00	Welcome, housekeeping, process, objectives, quick introductions	Peter Ballantyne
3:10	Welcome remarks	Dieter Schillinger, deputy director general, ILRI
3:15	Opening remarks and inauguration	Trilochan Mohapatra, Secretary, Department of Agricultural Research and Education (DARE) and Director General, Indian Council of Agricultural Research (ICAR), Government of India, New Delhi
15:25	Introduction: One Health initiatives brief intro why this initiative, what it will offer and what it could mean for India	Hung Nguyen and IDT team
15:50	Improving the proposal – exercise **Group 1 - Zoonosis control** • What are the main challenges for zoonosis control in India? • What are the priority interventions to address these challenges? • How to ensure that small-scale farmers and traders, and vulnerable groups such as women and youth are not excluded from the benefits of, or disadvantaged by, these interventions? • Key wildlife-livestock-people interactions that pose a risk for novel zoonosis emergence? • Key partners for implementation of interventions in zoonosis control **Group 2 - AMR control** • What are the main challenges for AMR control in India? • What are the priority interventions to address these challenges? • How to ensure that small-scale farmers and traders, and vulnerable groups such as women and youth are not excluded from the benefits of, or disadvantaged by, these interventions? • Water quality management actions to control AMR spread • Key partners for implementation of interventions to address AMR	 Facilitator: Habibar Rahman Notetakers: Ram Deka, Chi Nguyen and Vijayalakshmy Kennady Facilitator: Hung Nguyen Notetaker: Johanna Lindahl

	Group 3 - Food safety • What are the main challenges for improving food safety in India? • What are the priority interventions to address these challenges? • How to ensure that small-scale farmers and traders, and vulnerable groups such as women and youth are not excluded from the benefits of, or disadvantaged by, these interventions? • Water quality management actions to improve food safety • Key partners for implementation of interventions to address AMR	Facilitator: Arshnee Moodley Notetaker: Mohan Chadag
4:40	Plenary feedback	3 minutes for key reflections from facilitators
4.45	Next steps	Hung Nguyen
4:50	Closing remarks	Shri Atul Chaturvedi, IAS, Secretary, Department of Animal Husbandry and Dairying, Ministry of Fisheries, Animal Husbandry and Dairying, Govt of India, New Delhi
4:55	Appreciation and close	Habibar Rahman

Annex 2: Meeting participants

Name	Institution
Alok Sikka	International Water Management Institute
Amit Kumar	Brooke India
Anupam Gogoi	Department of Health Services, Govt of Assam
Arshnee Moodley	International Livestock Research Institute
Arun Padhiyar	World Fish
Ashish Kumar Samanta	SAARC Agriculture Centre, Bangladesh
Ashok Kumar	Indian Council of Agricultural Research
Bassirou Bonfoh	Centre Suisse de Recherches Scientifiques en Cote d'Ivoire
Bibhu Ranjan Das	Animal Health and Veterinary Services Department, Govt of Odisha
B J Das	Dairy and Livestock Sector Specialist, ARIAS Society
B. N. Tripathi	Indian Council of Agricultural Research
Braja Bandhu Swain	International Livestock Research Institute
B. R. Shome	National Institute of Veterinary Epidemiology and Disease Informatics
Chi Nguyen	International Livestock Research Institute
Debendra Biswal	Animal Health and Veterinary Services Department, Govt of Odisha
Dieter Schillinger	International Livestock Research Institute
Ellie Parravani	Brooke UK
Gaurav Rathore	National Bureau of Fish Genetic Resource
G. Gongal	World Health Organization
Gopal Tripathi	Veterinary Officers Training Institute
Habibar Rahman	International Livestock Research Institute
Hung Nguyen	International Livestock Research Institute
J. K. Jena	Indian Council of Agricultural Research
Johanna Lindahl	International Livestock Research Institute
JS Dharamadheeran	Brooke India
Jyotsnarani Biswal	International Livestock Research Institute
Kamini Walia	Indian Council of Medical Research
Manish Kumar	Indian Institute of Technology
Mahesh Jampani	International Water Management Institute
Mohammed B. Hossain	SAARC Agriculture Centre, Bangladesh
Monalisa Goswami	Commissioner to Food Safety, Govt. of Assam
Nidhish Bhardwaj	Brooke India
P. K. Agrawal	Odisha University of Agriculture and Technology, Bhubaneswar
Praveen Malik	Department of Animal Husbandry and Dairying, Govt of India
P. Swain	ICAR-CIFA, Bhubaneswar
Rajesh Bhatia	Food and Agriculture Organisation
Rajesh Dubey	Food and Agriculture Organisation
Rajeswari Shome	National Institute of Veterinary Epidemiology and Disease Informatics
Rajeshwari Sinha	Centre for Science & Environment, New Delhi
Ram Pratim Deka	International Livestock Research Institute
Ravishankar CN	Central Institute of Fisheries Technology, Cochin
R. K. Singh	Indian Veterinary Research Institute
Roma Oli	International Livestock Research Institute
S. B. Barbuddhe	National Research Centre on Meat
Shri Atul Chaturvedi	Department of Animal Husbandry and Dairying, Govt of India
Shri R. Raghu Prasad	Fisheries and Animal Resources Department, Govt of Odisha

Shri Smruti Ranjan Pradhan	Directorate of Fisheries, Odisha
Shri Upamanya Basu	Department of Animal Husbandry and Dairying, Govt of India
Shri Utpal Sarma	Dairy Development Department, Govt of Assam
Sudarshan Maliappan	International Water Management Institute
Sujith J Chandy	Christian Medical College, Vellore
Timothy KRUPNIK	International Maize and Wheat Improvement Center
Trilochan Mohapatra	Indian Council of Agricultural Research
Vijayalakshmy Kennady	International Livestock Research Institute
Vijay Pal Singh	Academy of Scientific and Innovative Research
V. Mohan Chadag	World Fish
Yeddula Vijay	Animal Health and Veterinary Services Odisha

Annex 3: Remarks by Secretary, Department of Animal Husbandry & Dairying

I am happy to be part of Strategic Consultative meeting on "Protecting Human Health through a One Health Approach" organized by International Livestock Research Institute (ILRI). This initiative of ILRI is rightly focusing on Zoonoses, Food Safety, Anti-Microbial Resistance (AMR), Environment, Economic, Governance and behaviour, which will enable bringing agenda of One Health to the forefront.

On Health is an approach which recognizes that animal health, human health and environment are inextricably connected. It has been seen in recent past that various health related issues having enormous socio-economic impact across the globe are emerging. These include emergence of new infections, re-emergence of existing diseases that are often neglected, detection of antimicrobial resistance at human-animal-environment interface and influence of climate change on vector-borne diseases and vector epidemiology.

Global health is facing growing threats posed by emerging zoonoses and impacting loss of hundreds of billions of US dollars causing massive economic damage in the past 20 years. The economic losses in past including impact of COVID-19 have proved that prevention and control cost is much less than the containment of disease cost.

In addition, the expected demand for animal-derived protein in the world will be doubled by 2050. Per capita availability of animal protein in high-income countries is expected to grow slowly over the coming decade. It is further expected that the gap in animal protein consumption between high and middle-income countries will decline by four percent, to 30 grams per person per day in 2030.

Besides these, rising food safety issues owing to changes in food preferences and global warming are also of great concern for various sectors that can't be tackled effectively by remaining confined to respective professional silos. Implementing One Health concept on ground is the need of the hour where collaborative synergistic efforts can be appreciated to attain optimal health for people, domestic animals, wildlife, plants, and the environment.

It is now well known that during last three decades, more than two third of the emerging infectious diseases of humans were found to have originated from animals. These diseases can be predicted through robust animal health surveillance system, including wildlife and the spill over to humans can be prevented by appropriate one health strategies if applied in timely manner. The detection and response to such occurrences also need a robust animal health management system to work closely with human and wildlife sectors.

Controlling zoonotic pathogens at their animal source is not important for only animal health outcomes, it is also the most effective and economic way of protecting people. Our efforts are more anthropocentric, there cannot be a stronger case for expanding and reinventing the entire Animal Husbandry sector for disease prevention, control and surveillance to minimize the threat to human health.

Department of Animal Husbandry and Dairying's (DAHD) initiative to implement an effective One Health framework by establishment of One Health Support Unit (OHSU) will strengthen systemic capacity to better manage animal health and reduce disease incidence at national level.

DAHD has also initiated to implement National Animal Disease Control Programme (NADCP) for FMD and Brucellosis, an important zoonotic infection affecting humans chronically and further

collaborating with the Health Ministry in developing National Action Plan for eliminating Dog Mediated Rabies (NAPRE) in India. Further, the Department has been working closely with the office of the Principle Scientific Adviser to the Government of India to develop an end-to-end digital platform for livestock sector, and aims to create a unique identification number (UID) for animals and their registration on Information Network of Animal Productivity and Health (INAPH) will help in real-time reporting of livestock disease and active surveillance of diseases.

Operationalizing a One Health approach requires leveraging the cooperation and strengthens of diverse sectors – both public and private – including livestock health, human health, wildlife health, environmental health, technology and finance to develop solutions to these local national and global health challenges.

DAHD is focussing on the interventions for overcoming challenges related to – veterinary manpower shortages, limitations of diagnostic services and epidemiological support, lack of information sharing between human and animal health institutions and inadequate coordination on food safety at slaughter, distribution and retail facilities.

Strengthening the livestock sector is one of the pre-requisites for effective implementation of One Health.

All sectors relevant to One Health need to come forward in an institutionalized formal mechanism for harmonised efforts in addressing these cross-linkages to successfully prevent the spill over of diseases to human population. Besides these, there is also a need to encourage a policy environment which enables core capacity building in order to respond to EID challenges.

The "Special Livestock Sector Package" including emphasis on animal health and infrastructure development – announced by GoI on 14 July – is a major step forward towards effective implementation of One Health.

The "One Health India" programme initiated by the Department is decidedly poised/ determined to work with all these sectors with a view that we complement each other while working together. We do envision not to keep the programme limited to only scientific experts but be open to the policy experts, local knowledge, practitioners, citizens and all relevant stakeholders to get their valuable feedback and expertise.

Essentially, the need to create preparedness policies, developing response mechanisms through public health programmes, identification of research gaps and the synergistic approach of different sectors is crucial. I believe, this event will facilitate exchange of knowledge and ideas between scientists from the diverse professional areas contributing to the cause of One Health in the country. The said platform will instigate a new dimension in understanding the thrust areas among scientists and researchers for analyzing the gaps and filling them by adopting global best practices adjusted to Indian conditions to achieve One Health in India in true sense.

To conclude, I would like to highlight the points regarding strategic directions for National One Health Agenda

- Work together towards health security through multisectoral collaboration
- Participate in interdisciplinary surveillance for early detection of zoonotic disease
- Build local, federal, and regional networks, share data
- Fully integrate the livestock sector into National and State One Health Systems.
- Incorporate wildlife and environmental sectors into National and State One Health Systems

- Increase capacity and workforce development through education and training
- Develop and implement active community engagement through a strategic approach
- Promote a One Health research agenda

What India needs to do, is to strengthen our pandemic response mechanism by enhancing capacity to prevent, detect, respond and recover. With this, I would thank ILRI for giving me the opportunity to be part of this strategic consultative meeting.

Annex 4: Presentation on the CGIAR One Health initiative

CGIAR

Science for a food-secure future

Protecting human health through a One Health approach 2022-2024

Initiative Design Team

One CGIAR initiative India stakeholder consultation meeting, 24 August 2021

ILRI IWMI WorldFish

Overall objective of the initiative

The One Health approach recognizes the interconnections between the health of people, animals, and their shared environment.

This initiative will generate evidence and develop tools enabling the redesign of food systems ***to improve human health*** based on One Health principles.

Why do we need an initiative for One Health?

- Increased frequency and severity of infectious diseases (including Covid-19) as people encroach on wildlife habitats and livestock and fish production systems intensify.
- Animal production systems are reservoirs of zoonotic pathogens, from which 60% of human pathogens originate
- Antimicrobial Resistance AMR causes 700,000 deaths annually and is projected to kill 10 million each year by 2050
- Foodborne disease takes a toll comparable to that of tuberculosis, malaria, and HIV/AIDS, but receives a small fraction of the investment from international donors
- Solving these challenges requires a One Health approach
- Leverages unique CGIAR capacity on One Health in food systems

Objectives

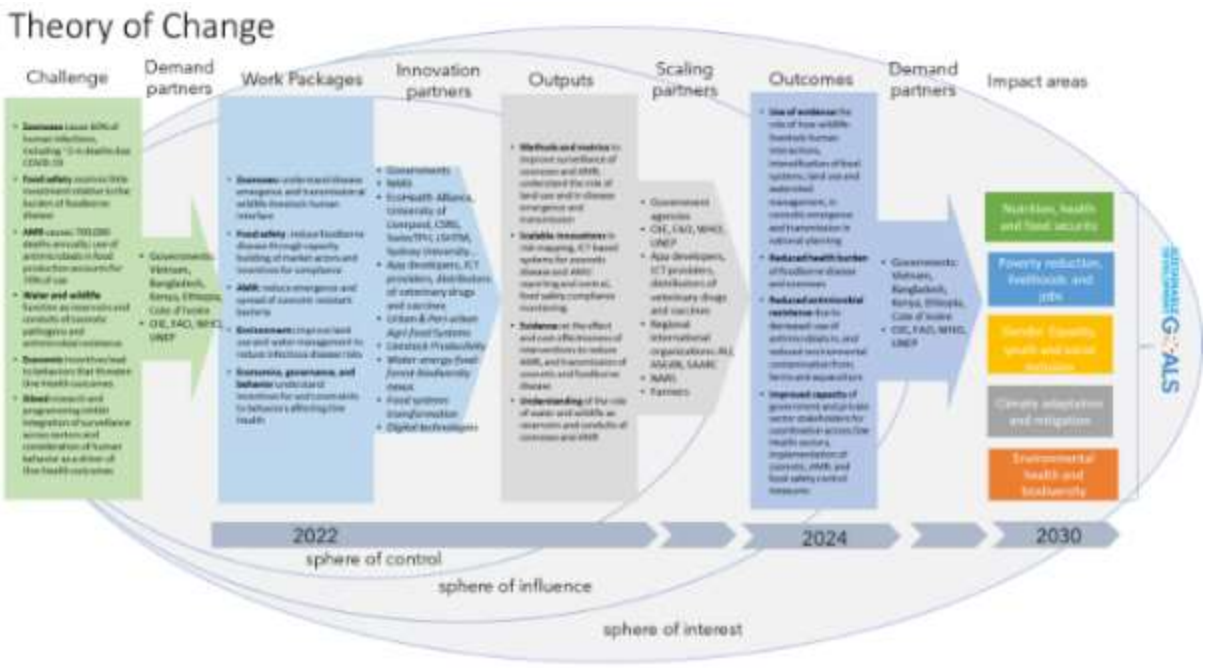
Protect human health through the improvement of the detection, prevention, and control of zoonoses, foodborne diseases and AMR in LMICs, by:

- Generating evidence to enable risk-based prioritization of geographies, pathogens, AMR genes, and exposure pathways, for surveillance, risk mitigation, incentivization of stakeholders, and regulatory enforcement.
- Evaluating impacts of technologies, tools, and approaches to identify and control zoonoses and AMR, and improve food safety and water quality.
- Integrating innovations into government partners' policies and programs and disseminate knowledge for further scaling.

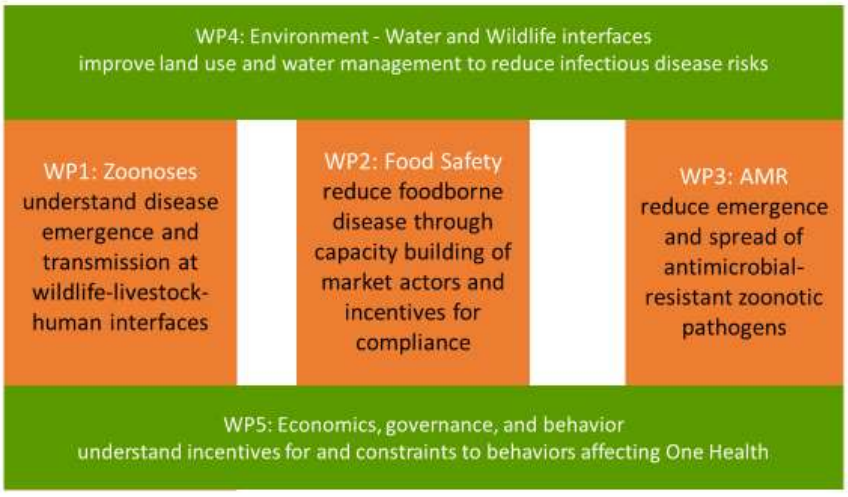
Research contexts selected based on zoonotic emergence, AMR & human health risk:

- Wildlife-livestock interactions
- Intensifying food systems
- Informal food systems

Between 4.3 to 41 million cases of disease could be averted annually through these efforts.



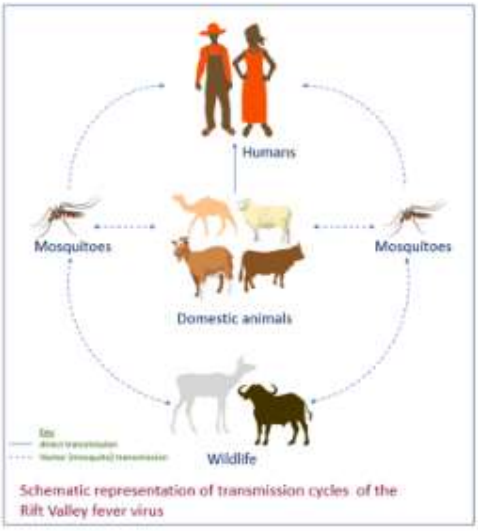
Proposed Work Packages and scope of work



WP 1: Zoonoses

Pre-empt emergence and spread of zoonoses with epidemic and pandemic potential at the interface of wildlife, livestock, and people through surveillance, identification of high-risk behaviors and geographies;

Reduce incidence of zoonotic pathogens associated with poverty.



Schematic representation of transmission cycles of the Rift Valley fever virus

Example Innovations in Zoonoses

1. Mapping of zoonotic disease emergence risk based on diverse data sources to identify and manage high-risk wildlife-livestock-human interfaces, and development of interventions to address this risk.
2. Development and deployment of new and existing diagnostic assays for use at slaughterhouses, enabling prevention of infected meat from entering the market and streamlining of zoonotic surveillance and control services.

WP 2: Food Safety

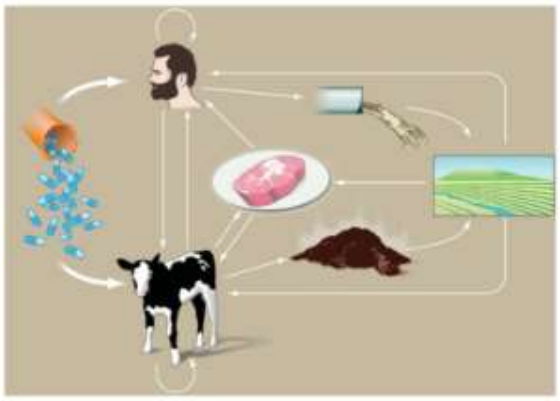
Reduce the burden of foodborne disease with a focus on animal-source and other perishable foods, including in informal and traditional food systems, through simple technologies and non-punitive governance approaches implemented along food value chains from production to consumption.

Example Innovations in Food Safety

1. Support of value chain actors to improve food safety through training, certification and promotion of consumer demand, and of governments in the development of feasible, non-punitive approaches to regulatory enforcement.
2. Simple, context-specific physical (e.g. color-coded surfaces and containers for raw and cooked foods) and behavioral technologies (e.g. nudges) to facilitate food safety practices by food system actors throughout the value chain.

WP 3: AMR

Reduce selection and spread of AMR from livestock, fish and crop production systems through reduced and better-targeted AMU, surveillance of AMU and AMR in animals and animal-source foods, improved manure management, and a better understanding of the environment as a reservoir for AMR.



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Example Innovations in AMR

1. Evidence on how livestock and fish production and farm profits are affected by reducing antimicrobial use while implementing alternative herd and fish health approaches.
2. ICT-based tools to enable farmers, agrovet dealers, and/or veterinarians to address livestock diseases without the use of antimicrobials.

WP4: Environment: Water and Wildlife interfaces

Improve land use and water management for the reduction of health risks, with a focus on pollution from agriculture and aquaculture, including zoonotic pathogens and antimicrobial residues and genes, and high-risk wildlife-livestock-human interfaces.

Example Innovations in Environment

1. Public strategy for the adoption and replication of good practices for the safe use of marginal quality water from farm to fork in informal settings.
2. Business models for resource, recovery and reuse of animal waste.

WP 5: Economics, Governance, and Behavior

Test effects of capacity building, incentives, and monitoring on behavior of value chain actors and government personnel providing support or oversight for relevant sectors through randomized evaluations. Model economic impacts of epidemics and control measures.

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Example Innovations in Economics, Governance, and Behavior

1. Performance management and accountability systems for public servants responsible for implementing surveillance and enforcement of antimicrobial use and food safety regulations.
2. Systems to facilitate compliance of small-scale producers, traders or vendors of livestock and aquaculture products with food safety, antimicrobial use, and animal waste management standards.

Prioritization process

To enable **impact within 3-year period**, regions and countries have been selected based on:

1) Existing CGIAR relationships
2) Government interest in One Health
3) Intensifying animal production systems and/or wildlife involvement in food systems

East Africa: Kenya, Ethiopia, Uganda
West Africa: Cote d'Ivoire
South Asia: India, Bangladesh
Southeast Asia: Vietnam

Themes/Research questions/Innovations selected based on potential for long-term impact on human infectious disease burden

Key CGIAR and External Research Partners

ILRI
IFPRI
IWMI International Water Management Institute
WorldFish
CSRS
EcoHealth Alliance
UNIVERSITY OF LIVERPOOL